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ABSTRACT

Two scientific ideas have been discerned in 20th century thinking: the structuralism common in Europe and the functionalism apparent in the United States. This paper presents two experiments in text analysis. One discusses the behaviorist writing style of Ernest Hemingway. It hypothesizes that since he is a behaviorist in practice, he should be a functionalist in thought. The basis for this hypothesis is the functionalistic Visual Cliff experiments in which a device was built for testing depth perception with the use of a behavior component. A text sample from Hemingway's 1927 short story, "The Killers," was studied through Perspective Text Analysis, and the result, portrayed in graphical terms, shows consistency between mind and practice in the sense that Hemingway is proved to be a functionalist throughout. The second experiment concerns the analysis of a test item that is supposed to be a description of the idea of functionalism. It has been difficult for students to distinguish this item from an item describing behavioralism. Using the same method, Perspective Text Analysis, it is shown that the item is a real representation of functionalism in that its functional component is transparent through the behavioral. It is concluded that the result of the two experiments is an invariant structure of the idea of functionalism. (Contains 9 figures and 27 references.) (SLD)

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Measurement and Representation of an Idea

Inger Bierschenk

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Abstract

A main line of thought in modernistic prose concerns the authors' efforts of transforming scientific concepts into literary forms. Two scientific ideas can be discerned in 20th Century thinking, the structuralism in Europe and the functionalism in the USA. This paper presents two experiments. One discusses the behaviouristic writing style of Ernest Hemingway and formulates the hypothesis that, since he is a behaviourist in practice then he should be a functionalist in mind. The basis for this hypothesis is the functionalistic Visual Cliff-experiment, in which a device was built up for testing depth perception with the use of a behaviour component. A text sample from a short story from 1927, "The Killers", has been studied by means of Perspective Text Analysis. The result has shown a perfect consistency between mind and practice in the sense that Hemingway is proved to be a functionalist throughout. The second experiment concerns the test of a test item. It is supposed to be a description of the idea of functionalism but it has proved to be difficult for students to discern this item from an item describing behaviourism. By the use of the same method it could be shown that the item is a true representative of functionalism in that its functional component is transparent through the behavioural. It is concluded that the result of the two experiments is an invariant structure of the idea of functionalism.

A Scientific Idea

From the 1920's onwards, two main streams of science can be discerned, the structuralism and the functionalism. Structuralism has a European basis (starting with Wundt) and has later on been applied in the form of Gestalt psychology, especially in Germany and Central Europe. The structuralism entered into competition in the USA with the functionalism, which was a counter-movement. Because, the structuralism was thought to be too narrowly oriented toward consciousness and the organisation of part - wholes in the formation of the human mind, it did not last long among American psychologists, since it was not able to provide psychology with mental tests and learning models. The functionalism and its stress on process was better suited to fit the pragmatic USA and John Dewey (the Chicago school) is regarded as its founder. The idea of functionalism transformed to psychological research, as opposed to the Gestalt formation of structuralism, developed into the activity-based movement of behaviourism. As is known, it took over the test development, which is dominated by the US ever since.

Functionalism and behaviourism are said to be difficult to separate in scientific practice. There is evidence for this view in, e.g. Chaplin's (1985, s 188) "Dictionary of Psychology", which means that American psychology certainly is heavily functionalistic in mind but behaviouristic in methodology. It means that experiments combine the two ideas and that they cannot be separated. One of the most famous experiments in American psychology has become known as "The visual cliff". I will shortly describe it, since it combines the two concepts in a way, which in fact makes them discernible: it simulated an environment, in which the behaviour of the subjects was a function of this environment.

A Functionalistic – Behaviouristic Experiment

"The visual cliff" builds on James J. Gibson's ecological theory of perception (Gibson & Walk, 1960) and was designed to simulate the concept of depth by constructing a risky terrain, consisting of a plane surface leading to an edge ending with a steep slope (cliff). A patterned material placed just underneath the shallow surface gave the impression of solidity whereas the same material placed at some distance below the surface at the other half gave the impression of depth. The entire environment consisted of glass, over which infants could move. The glass had the effect that the transition from solid surface to depth could not be judged by means of tactile feeling but could be perceived by the sight.

The scientific issue concerned whether the infants had built up a capacity to co-ordinate their body movements with their sight and thus could directly perceive the "deep" side as dangerous to cross or not. To get an answer to this question a person was placed at the deep side and had to lure the infants to move, after which the researchers could register variable behaviour. The infants reacted variably in the situation. Those who showed direct perception groped their way, were suspicious against the environment, cautious at the edge, and tried to avoid the unknown, for example by turning their back to the cliff or making a detour to come over. If they refused to cross, this was taken as indication of their perception of the cliff and understanding of the consequences of setting off into the unknown. The most conscious infants showed that they felt exposed and distressed and their cry towards the adult person who lured them over the edge was taken as indication of their being pained by the situation.

Both the functionalism and the behaviourism have been built into "The Visual Cliff" experiment. The way in which the simulation was applied, that is the content of

the experiment, can be described in behaviouristic terms: The infants were placed over the glass surface, were stimulated and gave a response by a certain crawling behaviour. The idea behind the design of the proper apparatus is functionalistic. This double aspect is also represented in the researchers as well. James J. Gibson had designed the experiment based on the ecological theory, which is a functionalist idea, whereas Eleanor Gibson in her role of pedagogue has performed the study with her methodological background in the behaviourism. A discussion of the history of the experiment is given by Gibson himself in the posthumous writings edited by Reed and Jones (1982, pp. 90-101).

From Science to Fiction – a Hypothesis

That pure literature is a reflection of social development is without any doubt. Therefore, the texts written by the so-called modernists will be ranked among the most typical of the 20th century. These authors were strongly impressed by the growth of modern society and the scientific knowledge of human life and behaviour that followed. Typical of the modernists is their effort of transforming modern scientific ideas into literary Gestalts. For example, James Joyce was clearly inspired by psychoanalysis, which by the association principle is close to behaviourism. Franz Kafka's works are strongly expressionistic and the anxiety he characterises connects to structuralism. However, it is not clear whether the writers of the 1920's just followed a modern trend or whether they consciously tried to transform scientific ideas into their writing. In any case, my hypothesis is that ideas of a certain time will find their way into literary texts irrespective of whether the writers are aware of it or not.

Experiment 1: Defining a Writing Style

One of the modernistic experimenters is Ernest Hemingway. As constituting idea behind Hemingway's writings sometimes the behaviourism is mentioned. This style is experimenting and is often described as hard-boiled, realistic and extremely poor as to lexical and syntactic variation (Holmberg & Ohlsson, 1999). Content-wise it is said to imply that people are being portrayed only by means of their actions and external behaviour. Thus writing style and characters are not being kept apart. The hard-boiled style is reflecting insensitive persons and is as accurate as the gangsters in the stories. Another characterising term used by Hemingway himself is the iceberg technique, which means that just a small part (1/8 to be precise) of what is said in a text can be found on the surface and the rest under it.

No doubt, Hemingway's language is consciously as free as possible from such a choice of words and a sentence construction, which may give rise to ambiguity. Thus he has very carefully avoided the metaphorical function of language, so what remains is an extremely trivial everyday prose. In that case, the point of departure is the idea that the language of the text shall simulate an information-flowing environment, which the reader perceives directly, without passing over some semantic interpretation. That the text will be directly perceived implies that the words are so concrete and basic that they cannot have any depth. Those who mean that Hemingway writes in a behaviouristic manner may have apprehended this style as if it were a matter of simple stimulation or reinforcement of patterns, which by extincting earlier incorporated patterns is leading the story forward. But a style that really would follow the pattern of a behaviouristic experiment would probably be unreadable. Further, in an analysis of an experimental text attributed to Skinner (founder of the theory) B. Bierschenk (1999a) has shown that the theoretical concept behaviourism expressed

into explaining text has deep dimensions, which however are not manifested at surface level. It may therefore be questioned whether there exists any behaviouristic "writing style".

However, it is plausible to say that Hemingway's technique of narrating is a sort of a trick in that he portrays persons as if they were the result of a shaping method without a pre-history and internal properties and without any chance to have an affect on their fate. They all seem tough and unmoved by dramatic events and never look back. But since the reader, according to the author himself, is supposed to understand the entire iceberg, the motifs of the actions, and thus the feelings, are thought to be read from out of what is said, so any extinction is not to hand. Of course one may argue that an idea, when transformed into pure literature, may still be apprehended, although it is not present in every detail. These arguments are all speculations, though, as long as style and content are not separated.

Whether Hemingway was aware of new psychological findings will not be debated here. But let us suppose that he instead of being a perception psychologist was an experimenting novel writer, who designed a text, which constitutes the perfect surface for simulating some depth. The surface is solid but transparent, and under it there is nothing. In that some figures have been placed into this environment, it becomes possible to make inferences about the virtual depth by their behaviour.

Method

The crucial methodological question is the extent to which it will be possible to register and measure structure and structural invariance on the basis of a text. This may be even harder to grasp in the case where the texts are so rudimentary in kind as the ones Hemingway created. On which properties can a method of analysis rely, when no one of the everyday words can be interpreted in a plausible way? Further, an iceberg, as big as 7/8 of the text, would imply that one has to use some method of interpretation, wouldn't it?

Hartman (1967) discusses the iceberg concept from an analytic-logical point of view and means that the iceberg is formed by purification, which leads to generalisation, which by necessity is devoid of meaning. It is obvious that such a purification process has been a conscious strategy by Hemingway. A study with computer simulations of Gibson's idea was reported by Becker (1973), in which he supposed that time sequences of analytic concepts would lead to the kind of synthesis implied in the experience of an environment. But, as pointed out by B. Bierschenk (1984b), synthesis is reserved to natural systems only. Only synthetic concepts maintain meaning, since the forming arises in the moment of perception. This should mean that it is not possible to establish any structure in Hemingway's texts and, consequently, no scientific concepts either. However, there is now a method developed for analyses of structure in all kinds of texts, regardless of their surface properties. The principles of this method will be given below.

Measuring the Articulation of Texts

Perspective Text Analysis is a method built on the premise that the founding axiom of evolution (AaO) also underlies text production (B. Bierschenk, 1991, 2000; I. Bierschenk, 1999a, 2000c). A text producer (A = Agent), expressing himself (through a = verb) about something (O = Objective) writes himself into the text in that the outer A-component governs the inner, i.e. (Aa→(AaO)). During this course text segments sometimes are excluded before and after the verb, which in the course of processing leave traces, telling at what distance from the path the missing segments

are to be found. This rhythmical time course in the text production may be equalised with a snake moving forwards-downwards and backwards-upwards to finally bite itself in its tail (Spencer-Brown, 1969). Thus the text is a self-referring system, just like any other natural system. With this prerequisite the method has been developed and tested in various contexts (see e.g., Bierschenk & Bierschenk, 1993; Bierschenk, Bierschenk & Helmersson, 1996).

The rhythmical movement of a text production is the manner in which natural language creates elasticity, which is necessary for communication. The more elasticity or implicitness, the more space is being created. What is meaningful in a text does not come about on a semantic level but by means of syntax (I. Bierschenk, 1989). Hemingway's texts may be rudimentary on the semantic level but as soon as there is an observable time course, a certain space may be read out from the measuring process. When the spherical shape of a text will be represented, this is done by a kind of graph that shows the entire extension of the text and its rhythmical formation in a so-called response surface. It builds on the number of A's and O's respectively per interval seen over time and related to the acceleration in the articulation.

The orientation of the text producer, that is, conscious perspective on the objective, is flowing into the textual level (the inner level), but the underlying idea, the intention governing (outer A) is usually not accessible. The structural analysis to be used represents both the intention and the orientation of the text in a so-called holophor (B. Bierschenk, 1999b). The holophor is an information synthesis, which by calculation of the textual radians shows a conceptual configuration (B. Bierschenk, 1996). These concepts are natural, i.e. empirically founded and not a priori defined.

Subject

The study to be reported is a "single subject experiment", which has the following premises (transformed from Kugler & Turvey, 1987, p. 213). The individual subject, Ernest Hemingway, is considered a representative or token of the entire biological system writing pure literary prose. But it is the individual subject, not the biological type, who represents the writing event. Every writer obeys natural law but since not all of them do it uniformly, the point of departure is that every single individual contributes with a unique physical context within which the law is reflecting itself. The method Perspective Text Analysis will be used to identify the individual co-ordinates, which give the conceptual configuration and thus the manner in which the invariance or law is expressed through the individual.

Text Material

Hemingway developed as journalist his laconic style very early and worked on it and refined it gradually. Many of his early short stories are often pointed out as typical of his writing style, as also one of the last works, "The Old Man and the Sea", which granted him the Nobel Prize. I have chosen a passage from "The Killers", which appeared in "Men Without Women" (Hemingway, 1927/1977), an edition of short stories. A main reason for choosing it is the typical dialogue. The passage takes up about 1/16 of the entire story and is to be found in the first half.

Why this selection? Perspective Text Analysis does not require any statistical considerations. It operates at a level, which lays bare both the uniqueness of a person as well as the invariance. As the word level is quite uninteresting in an analysis of structure, it does not matter where I take the specimen. Every sample represents every other. The sample used is the following:

Sam, the nigger, standing in his apron, looked at the two men sitting at the counter. 'Yes, sir,' he said. Al got down from his stool.

'I'm going back to the kitchen with the nigger and bright boy, 'he said. 'Go back to the kitchen, nigger. You go with him, bright boy.' The little man walked after Nick and Sam, the cook back into the kitchen. The door shut after them. The man called Max sat at the counter opposite George. He didn't look at George but looked in the mirror that ran along back of the counter. Henry's had been made over from a saloon into a lunch-counter.

'Well, bright boy,' Max said, looking into the mirror, 'why don't you say something?'

'What's it all about?'

'Hey, Al,' Max called, 'bright boy wants to know what it's all about.'

'Why don't you tell him?' Al's voice came from the kitchen.

'What do you think it's all about?'

'I don't know.'

'What do you think?'

Max looked into the mirror all the time he was talking.

'I wouldn't say.'

Design and Procedure

The difference between "The visual cliff" experiment and the literary text is a transformation of level. The infants' reactions were signs of direct perception of depth and the researchers, who were observing the single courses, knew how they should interpret the reactions. A typical Hemingway text, which is not a description of a similarly concrete situation, should instead give the reader an understanding of depth with no revealing signs from the characters. They do not tell about their feelings in the situation, they may even be unaware of what is going on. The virtuality is projected from the readers' perspective.

B. Bierschenk (2000) has experimentally demonstrated that the intention of "The visual cliff" experiment, the way it was expressed by the researchers themselves in the figure caption (Gibson & Walk, 1960, p 65), has been directly transformed from the visual to the symbolic level. By using Perspective Text Analysis he could show that the researchers' design to vary the properties of the surface (viewpoints) and the infants' movements over it (perspective) gave rise to the same meaning when this design was described verbally. Bierschenk's study could prove that the depth in the design was exactly reflected through the spherical shape of the graph.

The study of the evolution of knowing and suggestions as to how design experiments at various transformative levels has been discussed within the frame of cognitive science research (B. Bierschenk, 1984a, 1994). The actual experiment, in which the readers' understanding shall be the effect of the manipulation of language expressions, is schematically described in Figure 1.

A fixation of both A (Perspective) and O (Viewpoints) means Symbol, which is stationary and functions as the zero-hypothesis for the reading process. To develop understanding requires syntactic movement. As has been obvious from the discussion, Hemingway tries to stabilise the symbols until they do not afford any variable interpretations. Accordingly, other combinations will vary in this study. Thus (-+) means that the objects vary while the perspective stays the same (persons as types, i. e. roles). The (+-) case means that the perspective, i.e. the function, varies (persons move in the room and talk from different angles). A refinement of this technique is to

let someone look into a mirror to reach perspective change without functional movement as in the text example used. In this way Hemingway manipulates the perspective for the reader to obtain understanding (++). The diagonal (-+, +-) represents events at the textual level whereas the opposite diagonal represents the writer's intention. The diagonals have a complementary function. This design will be governing for the presentation of results.

Figure 1.

Design for the Study of Hemingway's Writing Style

		O	
	-+ a	–	+
A	–	Symbol (Verbal Expressions)	Variation of Type (Roles)
	+	Variation of Function (Placing)	Understanding (Effect of Reading)

Results

The Textual Space of The Killers

The first two analyses concern the spherical representation of the way in which Hemingway models an environment for a reader. Figure 2 shows the O-component of the textual level, that is, the variability in the types (-+). The response surface gives the overall impression that the text is very intensive and explicit, which implies that it is sparingly expanded. The course goes on close to the 0-line. There is a couple of places in the text that have caused shadows (value under 0-line). This formation below sea level denotes that after all there is something implicit in the Objective. Maybe this angle helps the reader make his projection, because any iceberg in the form of some 7/8 shading is not present. The Objective variation is poor and tightly pressed, which must be interpreted as a purification of the symbolic level.

The texture of the O-component gets its complement through the A-component. The way in which the writer has varied the function (+-), forms a space of similar shape, which Figure 3 shows. There is no indication of implicitness in this space and therefore it is somewhat more pressed together than the first one. If the text is compared against its space it becomes obvious that more than one textual agent is operating. But since the environment, upon which they act, is modelled such that it in principle shall project the same understanding irrespective of the angle of the figure, the space expresses the extremely clear relation between the figures' status of being objects and their acting function. It seems as if Hemingway has formed in words the perfect experimental subjects (A). Finally the complementary shapes of A and O is an evidence of the rigid action radius consciously worked out by the writer.

Figure 2.

The Objective-Space of The Killers

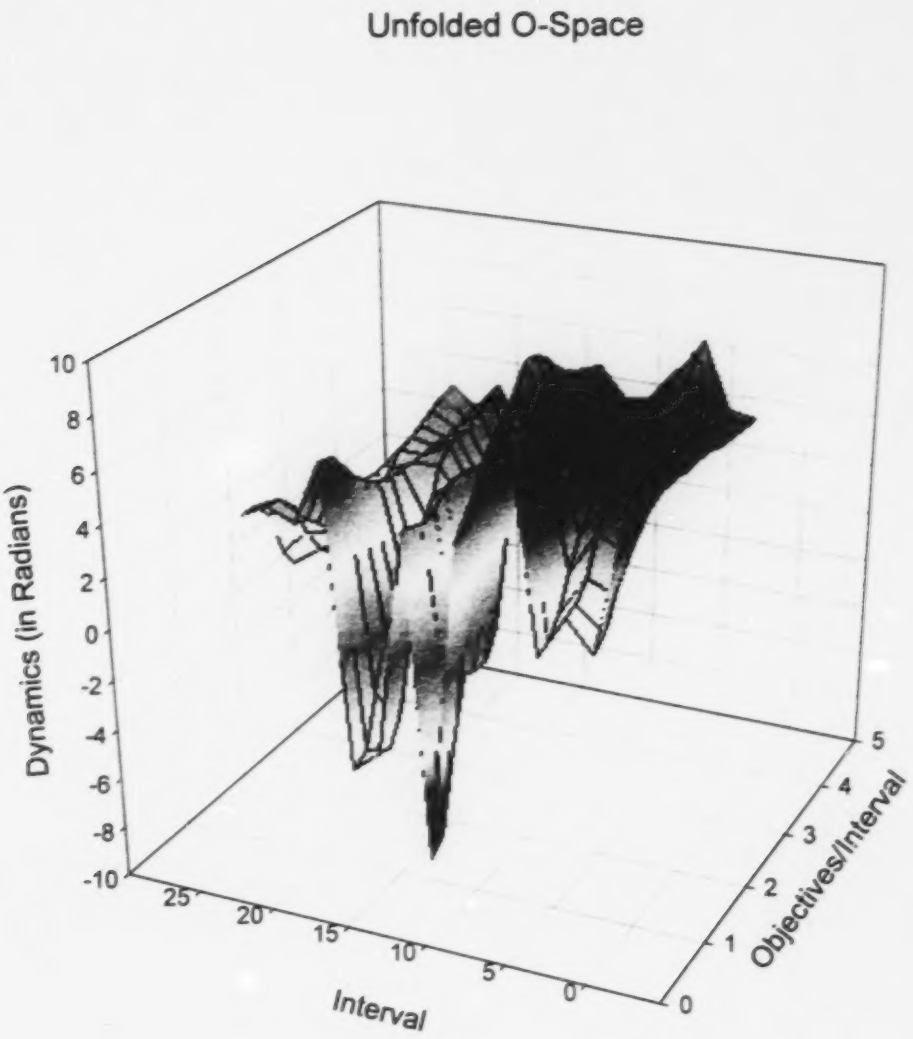
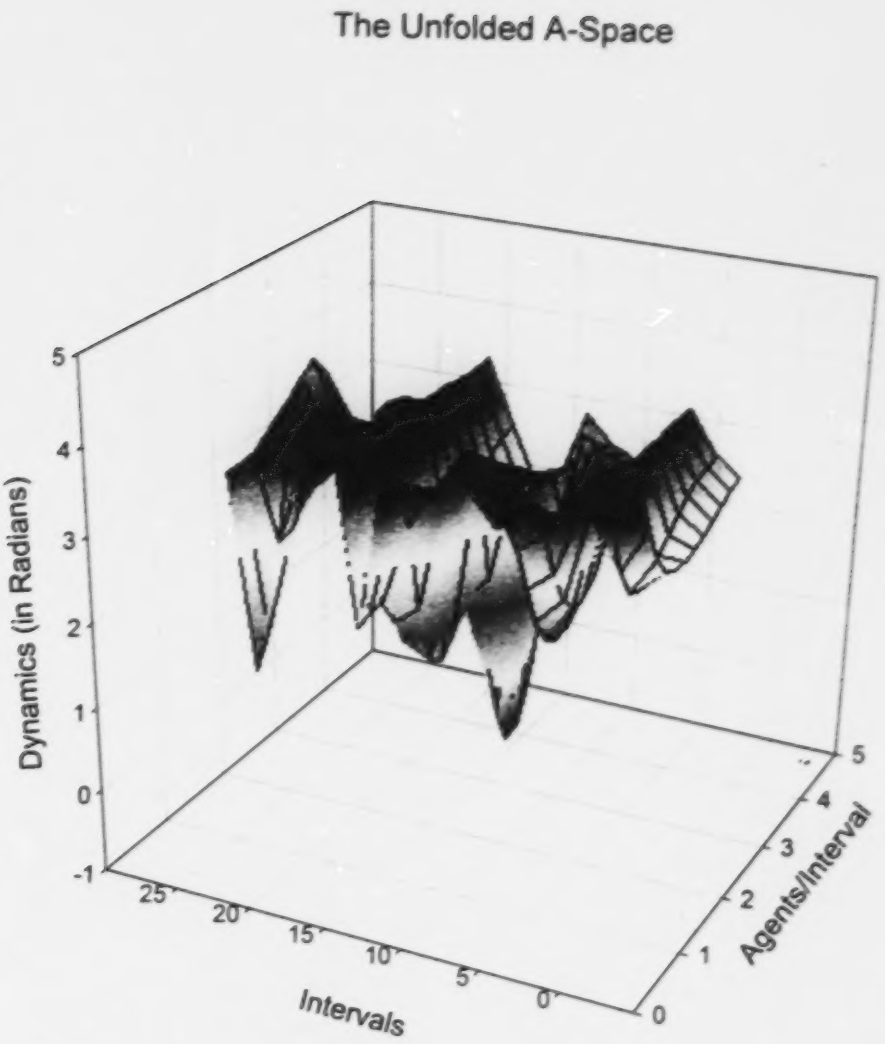


Figure 3.

The Agent-Space of The Killers



The Informational Structure of The Killers

Does the narrow surface layout reflect an information structure corresponding to the functionalistic - behaviouristic experimental design, which has been expected? The answer is given in the folded spaces of the Figures 4 and 5. The holophor in Figure 4 shows the O-component, that is the objective of the writer's effort. In this analysis a landscape emerges without deep valleys, with an evident surface plane and some sharply profiled tops. Their forming tells something about the rotation, which is a function of the stretching of the time-course, the slowing down by expansion and also acceleration. This figuration should be interpreted such that the tops express that the text has been built up by accumulation in the textual surface, like surface waves. The less implicit the relations are the more the surface has to compress, which makes it sharp. Therefore, it is interesting to note that, nevertheless, there are a few implicit concepts. These are *Translation*, *Contextualisation* and *Fiction*, which in fact underlie a realistic piece of prose.

The graph forms three evident mountain chains: a section of lower foothills with *Conspicuousness*, *Caution* and *Estrangement*, a formation with two higher peaks, *Hostility* and *Pain* and between them a lower top marking a *Risk*.

The fiction, which the writer has created, is a contextualisation of the suspiciousness, cautious behaviour and feeling of not being capable of mastering the situation, which the infants show on the visual cliff. The persons at Henry's are like subjects, who are exposed to something unknown and who therefore have no preparedness for action. The entire situation is risky and hostile, despite that the trivial dialogue does not give away anything like that. If a camera had taken photos of the simulated depth it had not been capable of registering it, since the size of the squared pattern had been adjusted for the projection. However, the infants did register the depth directly, in spite of the adjustment, which proves that the human ability to depth perception has a structural foundation. By the method of analysis used it becomes evident that the ability to evoke structure is built into Hemingway's text as well.

So, what does he actually translate? Well, the expression of understanding of the consequences of the depth lying in the concept *Pain*. This is exactly what the functionalistic experiment aimed at testing by means of a behavioural component. Hemingway has simulated the pain. Max, Sam and the others are nothing but figures in the landscape for producing this effect. A perfect visual cliff-experiment, although in words. Thus the holophor represents the synthesis of the inner parenthesis, which functions as objective of the outer.

The Agent-component stands for the perspective governing of the text. The holophor of Figure 5 thus represents the intention by which the orienting component of the text has been produced. Here we get an explanation to the synthesis in Figure 4. Just like the researchers constructing the visual cliff this outer agent constructs a threat with functionalistic firmness. *Hostility* and *Firmness* lie within the same mountain chain, with the resolute accuracy as highest peak, expressing a technical aspect. The second highest mountain peak is *Pain*, which is formed by *Disregard* and *Imaginary*. These represent the intention to design an environment, which is virtual (imaginary) and whose painful dangerousness therefore should be neglected.

As in the space analyses these formations are similar too. A and O are each other's complement. The foothills to the right of Figure 4 represent the behaviour component while the functional component emerges to the left in Figure 5. *Hostility* and *Pain* both have a subjective and an objective side and evolve in the analysis as a unity, which Perspective Text Analysis has been capable of discerning.

Figure 4.

The Informational Structure of The Killers: Objective

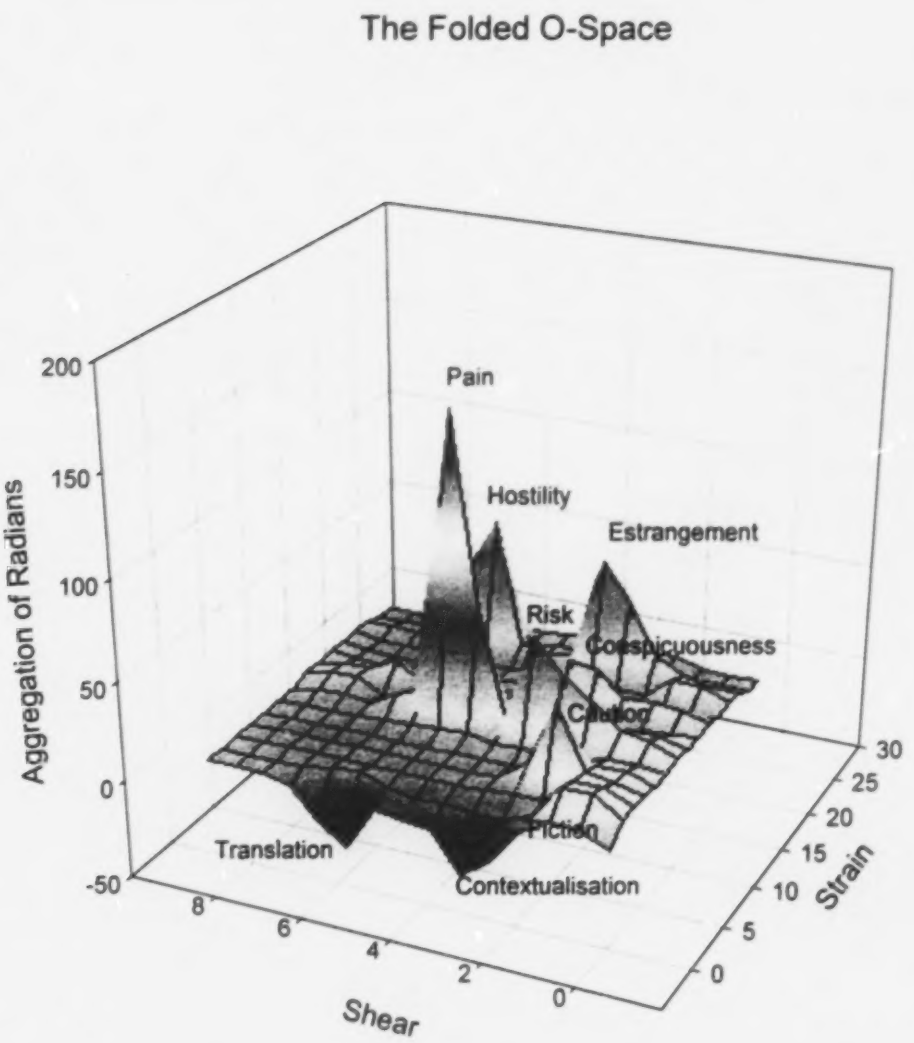
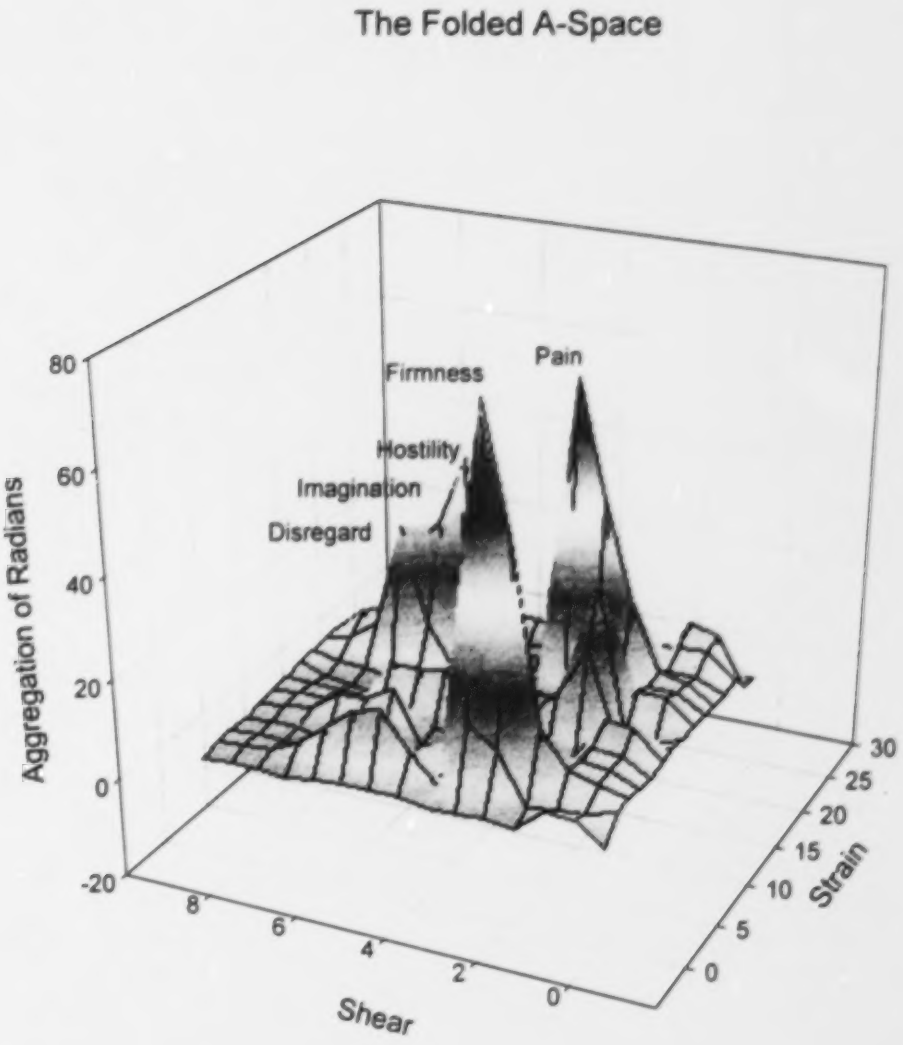


Figure 5.

The Informational Structure of The Killers: Agent



Discussion

Transforming the ecological level of "The visual cliff" experiment to a level at which the behavioural component is the written action means that the experiential variables (child and cliff) were replaced with symbols. This measure introduced an involvement of the designer with the designed, which is different in type compared to the former level, although not different in kind. Letting the writer Hemingway take the functional position of experimental designer means that he has been the representative of the way a story writer writes himself into the textual level.

Whether Hemingway was aware of the functionalist view or not, the A and O spaces (Figures 2 and 3) show that he tried to model the textual surface so that the Agent and Objective sides should be as symmetrical as possible, avoiding all kinds of verbal edges. This is against the law of natural language production, because the (A →(AaO)) model presupposes asymmetrical relations in the two components, which the method usually confirms when applied on naturally developed texts. Thus Hemingway has consciously worked out the textual surface with the aim to make it as regular as he could. One of his tricks is then to write a dialogue, since by the change of textual agents he can avoid syntactic relations that create implicitness. However, he did not manage to design the complete solid surface. A little slip of the pencil (Figure 2) makes clear that there is a writer perspective built into the text. This result validates the method of analysis.

It is also interesting to note that the concept *Pain* was as important to Hemingway's writing as his life was a matter of avoiding pain (Bjørneboe, 1999). Such an external validation of the results is not less interesting.

Experiment 2: Testing a Test Item

In the teaching of modernism in literature, the isms and their transformation into poetry and prose are not to be avoided. Especially the prose makes a lot of trouble, because it is difficult to apprehend whether an idea has been transformed into literature. This has been the issue and an area of study in a number of classes at upper secondary level. In connection with a course in the early 20th century literature I prepared a test, which was aimed at measuring the comprehension of 20th century ideas and concepts (I. Bierschenk, 1997). I was particularly interested in structuralism, behaviourism, and functionalism, since these concepts were significant for the mode of thinking during the modernist period of time. I looked into scientific works, such as handbooks of psychology, to collect definitions of the concepts and demarcations towards one another. The process of selection and definition has been described in detail in I. Bierschenk (1997) as also the instruction procedure and the test that followed.

The test came to include fifteen texts, each one being a description of a modern concept in function. The choice of texts is the result of a careful preparation in the form of both studies of sources and experimentation. Some of the texts are constructions and some were exactly reproduced from a textbook or from the empirical reality, although slightly modified. The text representing the functionalism is taken from an American textbook of psychology, slightly modified. It is worded:

I get up at 6.00, study until breakfast, go to the class, the lab and the library and take at most 15 minutes pause during the day. After that I study till exactly 9.00 in the evening and go to bed. I never go to the cinema or the theatre, seldom to a concert, have almost never a date and read nothing but course books.

Constructing a test item is one of the most crucial tasks in e.g., psychology, psychotherapy, medicine, social science and education. The experiment on Hemingway's writing style has shown that it would be possible to construct a text with the purpose of describing a scientific concept in function, even though this might be highly abstract.

The test item presented has been difficult for the students to identify as a description of functionalism and they have mixed it up with behaviourism. In the light of the results reported in this article it may be assumed that the textbook writers and myself, who tried to explain the concept of functionalism by this example, did not succeed in making the distinction. Thus it is hypothesised that, just like in the Figures 4 and 5, the behaviourally specified concepts should emerge in the O-component and the functionally specified concepts in the A-component. If it is a true functionalistic text, it should moreover be very explicit and thus its articulation should create a clearly surface-oriented space. The following experiment will be a test of whether the test item is a true representative of the concept of functionalism transformed into text.

Results

There are clear similarities between Hemingway's dialogue and the test item in that both text surfaces show a rudimentary lexical level and very simple syntactic constructions. This is particularly obvious in the item, since the clauses follow serially, adding one textual agent's orientational facts within an extremely narrow radius. The first analyses (Figures 6 and 7) show the degree of explicitness in the O- and A-component respectively.

The Textual Space of a Test Item

Figure 6 represents the Objective of the text. Its wing-like shape has a very flat extension in the space and there is no sign of structural depth. Compared to the dialogue this shape appears as smooth, because only one agent has any input on the perspective structure. Figure 7 shows the implications of this agent function. It is clearly manifest in that "I" is rewritten throughout the text, although not explicitly stated at every position. It is, however, so close to the surface that no shading occurs in the processing. But the fact that the agent is rewritten repeatedly and consistently produces a swelling space. Consequently, the Objective structure would have been more expanded, if the perspective had not been reduced, because variability in type (see Figure 1) is not enough for producing space, some variability in function would be required too. This result may explain why the students had difficulties with the item. However, to get a confirmation we have to look at the informational structure.

The Informational Structure of a Test Item

The holophor of Figure 8 shows a landscape with a high mountain massive in the middle and some lower foothill formations at both sides, which are making up the peaks. *Sequential Course*, *Schedule*, *Controlled Reduction in Strictness* and *Orderliness* are contextualising concepts and thus represent the behavioural component of the text. The person named "I" is portraying her-/himself by describing a lifestyle as a college student. It is a strict life, bound to sequential order and heavily scheduled, which very seldom deviates from the forward path. This way of organising oneself is fostering the kind of *Assignment* that the person imposes on the self. Thus *Self-discipline* is both the aim and the outcome of such an everyday life. So far the behavioural component of functionalism can be confirmed.

Figure 6.

The Objective-Space of a Test Item

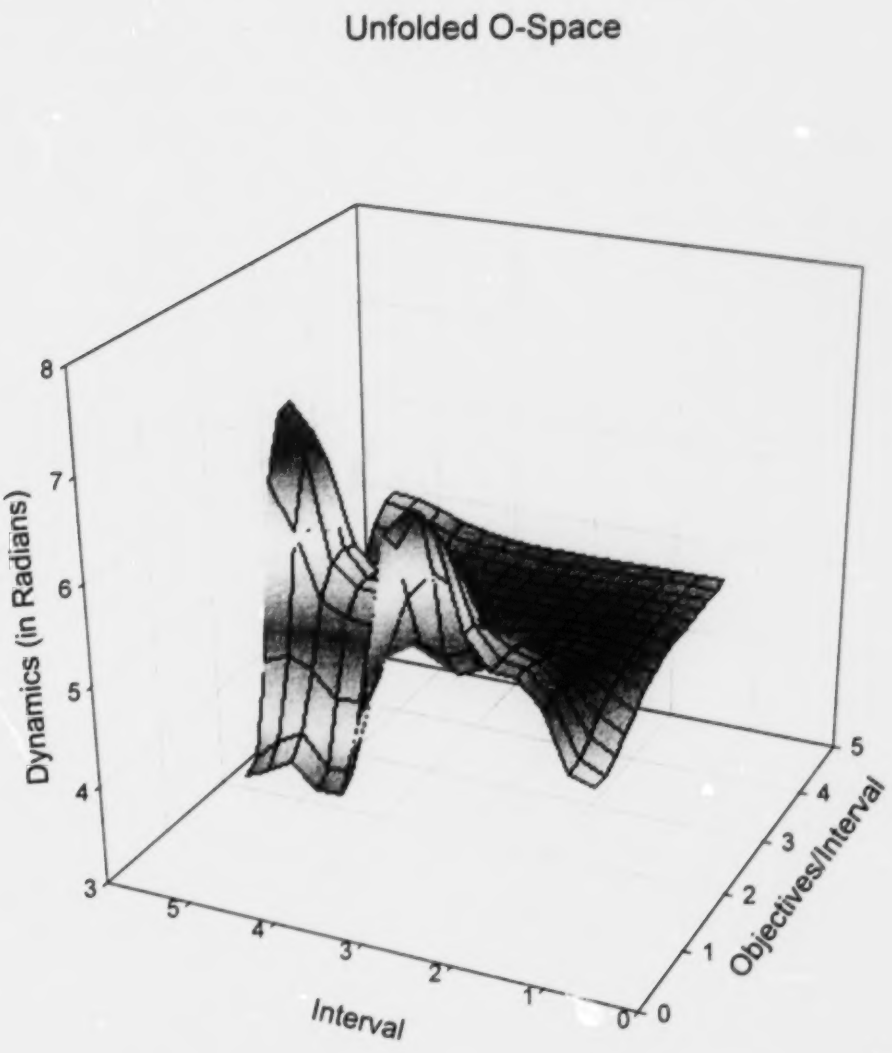


Figure 7.

The Agent-Space of a Test Item

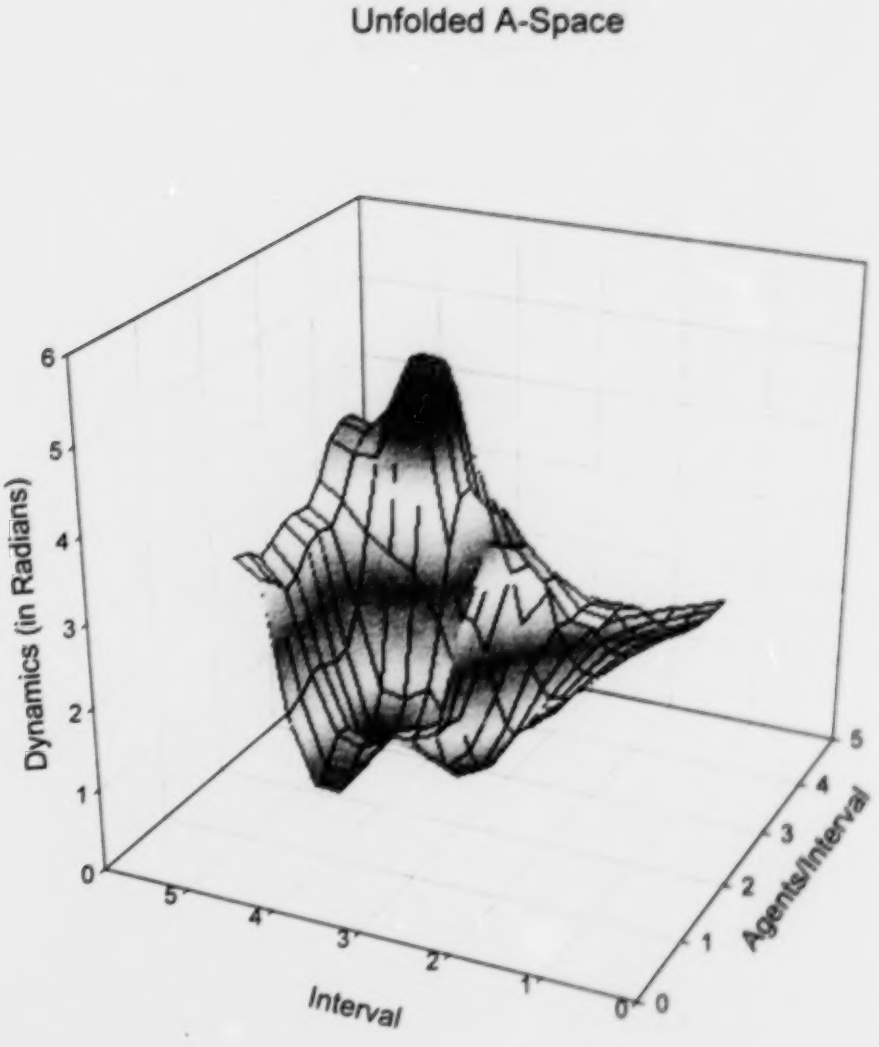


Figure 8.

The Informational Structure of a Test Item: Objective

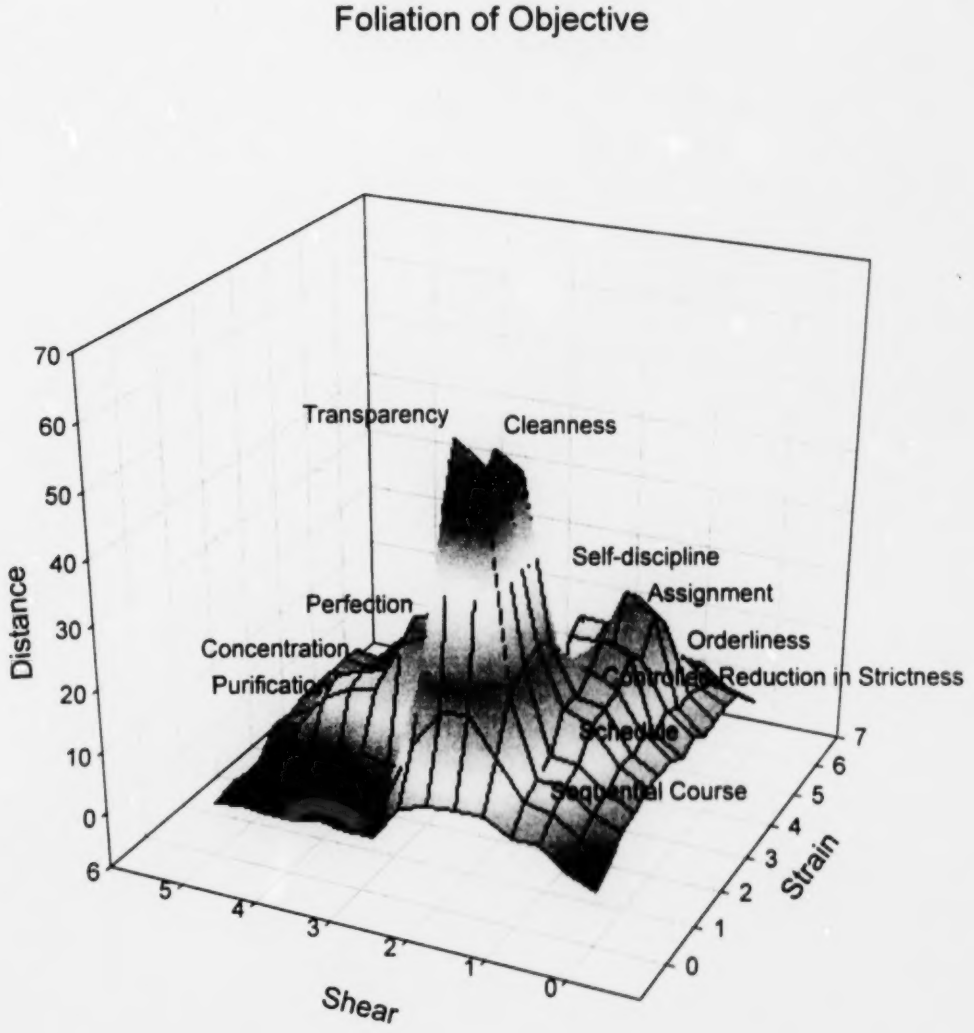
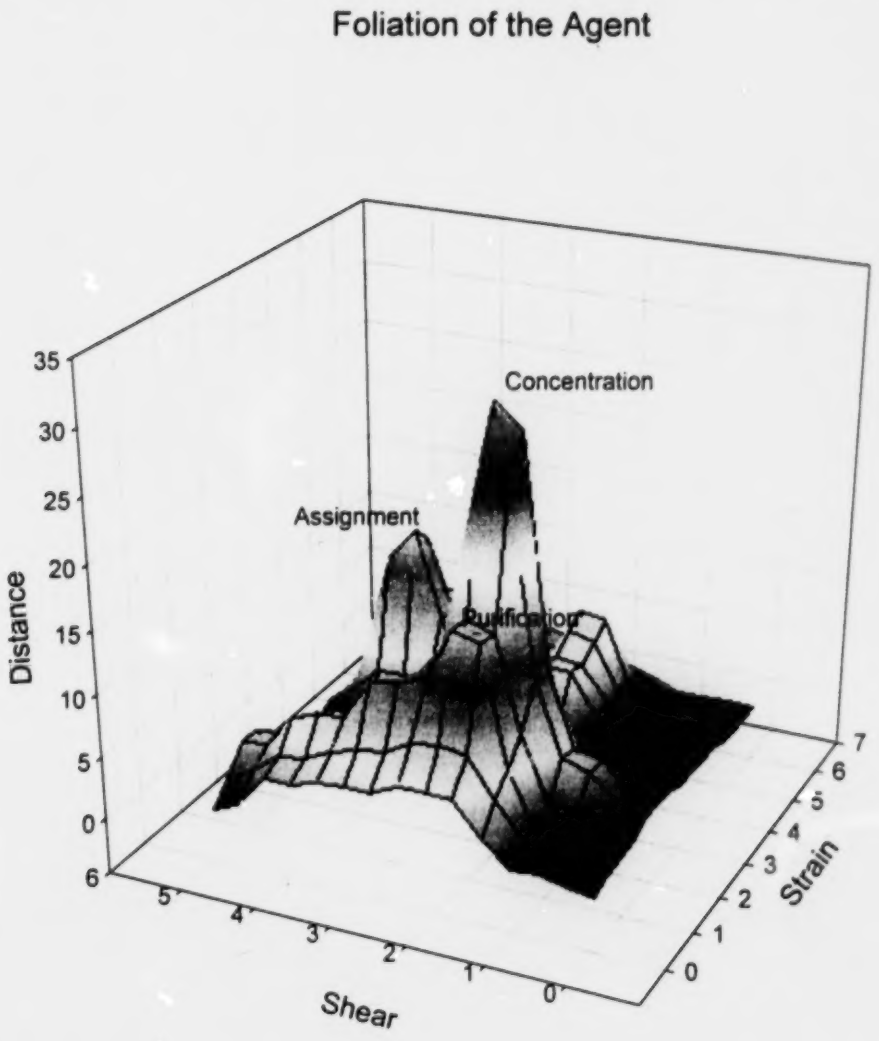


Figure 9.

The Informational Structure of a Test Item: Agent



The formation to the left reflects more of the ideas governing the behaviour, namely *Purification*, *Concentration*, and *Perfection*. These are in perfect accordance with the functionalism in general, i. e., the striving towards "purity", which means exclusion of every inappropriate form (The German Duden dictionary, Volume Fremdwörterbuch). Like the designers of "The visual cliff" this person designs her/his own life towards perfection. The behavioural side of the holophor is concentrated in *Cleanness*, whereas the functional side is forming *Transparency*. It is interesting to note that these concepts in being the most concentrated at the same time function complementary to each other. The clean behaviour level will make the underlying idea transparent, i. e., the functionalist personality of the item can be discerned only by behaviouristic manners. Theory in practice!

Figure 9 finally gives the picture of the Agent structure. The three most salient concepts of the perspective are *Purification*, *Assignment*, and *Concentration*. This holophor clearly shows that the perspective structure is formed out of the functional side of the Objective structure. Purification as the basic idea of functionalism as an idea in architecture forms the platform, whereas Assignment represents the individual striving of the functionalists to work on the special task of refining irrespective of context. Together they are forming the highest mountain peak, which is self-defining. As far as one can see, the informational structure of the test item is typical of functionalism in that the person's mind is expressed by the behaviour. Moreover, the item is more purified and concentrated than Hemingway's text, which may be due to the fact that the imagined outer agent is identical with the inner. This circumstance constitutes the transparency, which implies identity between the functionalist and its behaviour. The true operational definition.

Discussion

A function is an abstract line, which is formed at the cutting edge of several entities or a dividing line, which gives rise to discontinuity. Consequently, function and structure depend on each other in scientific work. Depth perception, a mark of structure, is a function of an angle and the projection of a dynamical pattern. The angular articulation in a functionalistic text is extremely narrow, that is, the A-a-O sequences are so tightly bound to the surface that they form a right angle, 180°, which has a degree of information corresponding to "non-sense" (B. Bierschenk, 1999a). As we know, this angle does not produce any shadow (values under 0-line).

With respect to the quality of the test item, it can be concluded that a text exclusively based on function is from the empirical point of view very difficult to digest. So, the item in question is a perfect functionalistic item. The problem is to teach students to apprehend the function in textual operation. Finally, with respect to item construction in general, is has been proved that the method of analysis can be used as a means of testing the structure of item texts, so as to guarantee that their conceptual relations are the ones desired for a certain task.

Concluding Remark

The functionalism is a scientific and literary idea. It has been measured and represented in the forms of textual spaces and informational structures, in which the idea could be separated from its practice in a Hemingway story (1927) and a test item (1997). The story relates structurally to a scientific context, which simulates *Pain* and the item to a literary or fictive context, which simulates *Concentration*. Against the background of the double aspect of functionalism they are invariants of the same idea.

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